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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,358	05/10/2004	Calvin Gabriel	US00 8015A	8246
24738	7590	04/06/2005	EXAMINER	
PHILIPS ELECTRONICS NORTH AMERICA CORPORATION INTELLECTUAL PROPERTY & STANDARDS 1109 MCKAY DRIVE, M/S-41SJ SAN JOSE, CA 95131			NGUYEN, DILINH P	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 04/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/603,358

Applicant(s)

GABRIEL ET AL.

Examiner

DiLinh Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-12, 14-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-12, 14-18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 10-12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Goh et al. (U.S. Pat. 6225225).

Goh et al. disclose a selective etch shallow trench isolation barrier integrated circuit chip fabrication process comprising the steps of:

forming a shallow trench space in a wafer;

depositing a selective etch isolation material in the shallow trench space to fill the trench space and to form a selective etch shallow trench isolation barrier 60 and 56;

fabricating an intermetal dielectric layer 76 on the wafer such that the intermetal dielectric layer is disposed in direct contact with the selective etch isolation material 60 and 56 (fig. 15) in the shallow trench space;

etching a contact hole in the intermetal dielectric layer down to the selective etch shallow trench isolation barrier such that at least a portion of the selective etch isolation material is exposed; and

filling the contact hole with conductive material 84 and 88 (fig. 15);

wherein the selective etch isolation material 60 and 56 (silicon nitride and oxide) and the intermetal dielectric layer 76 (silicon oxide) are formed of different materials having different etch characteristics, such that the selective etch isolation material may be exposed to the intermetal dielectric layer etching without having any significant amount of the selective etch isolation material etched away (fig. 15, column 5, lines 35-60).

- Regarding claim 11, Goh et al. disclose the step of etching of the contact hole in the intermetal layer 76 (fig. 14) down to the selective etch shallow trench isolation barrier is a single film layer etch step stopping on selective etch isolation material of the selective etch shallow trench isolation barrier (fig. 14).
- Regarding claim 12, Goh et al. disclose the steps of the intermetal dielectric layer 76 comprises oxide and the single film layer etch step is performed by Ar, CF₄, CHF₃, CO, and/or C₄F₈ (fig. 15, column 5, lines 40-44).
- Regarding claim 14, Goh et al. disclose the selective etch isolation material includes silicon nitride 60 (fig. 15).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 10-12, 14-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA (fig. 1) in view of Goh et al. (U.S. Pat. 6225225).

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- Regarding claim 10, AAPA (fig. 1) discloses a selective etch shallow trench isolation barrier integrated circuit chip fabrication process comprising the steps of:
forming a shallow trench space in a wafer;
depositing a selective etch isolation material in the shallow trench space to fill the trench space and to form a selective etch shallow trench isolation barrier 150;
fabricating an intermetal dielectric layer 107 on the wafer;
etching a contact hole 191 in the intermetal dielectric layer down to the selective etch shallow trench isolation barrier such that at least a portion of the selective etch isolation material is exposed; and
filling the contact hole with conductive material 195 (fig. 1, pages 3-4).
- Regarding claim 17, AAPA (fig. 1) discloses a selective etch shallow trench isolation barrier integrated circuit chip fabrication process comprising the steps of:
applying layer of oxide and nitride to a wafer (fig. 1, page 2, lines 1-2);
creating a resistive mask pattern (fig. 1, page 2, lines 3-5);
etching a shallow trench space (fig. 1);
depositing a selective etch isolation material in the shallow trench space to fill the trench space and to form a selective etch shallow trench isolation barrier 150;
fabricating an intermetal dielectric layer 107 on the wafer;

etching a contact hole 191 in the intermetal dielectric layer down to the selective etch shallow trench isolation barrier such that at least a portion of the selective etch isolation material is exposed; and

filling the contact hole with conductive material 195 (fig. 1, pages 3-4).

AAPA (fig. 1) fails to disclose the intermetal dielectric layer is disposed in direct contact with the selective etch isolation material in the shallow trench space.

However, Goh et al. disclose a selective etch shallow trench isolation barrier integrated circuit chip fabrication process comprising the steps of: fabricating an intermetal dielectric layer 76 such that the intermetal dielectric layer 76 is disposed in direct contact with the selective etch isolation material 60 in the shallow trench space (fig. 15);

wherein the selective etch isolation material 60 and 56 (silicon nitride and oxide) and the intermetal dielectric layer (silicon oxide) are formed of different materials having different etch characteristics, such that the selective etch isolation material may be exposed to the intermetal dielectric layer etching without having any significant amount of the selective etch isolation material etched away (fig. 15, column 5, lines 35-60).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of AAPA by having the intermetal dielectric layer is disposed in direct contact with the selective etch isolation material in the shallow trench space, as taught by Goh et al., in order to increase the contact area for the contact plug (fig. 14, column 2, lines 53-54).

- Regarding claims 11 and 18, Goh et al. disclose the step of etching of the contact hole in the intermetal layer 76 (fig. 14) down to the selective etch shallow trench isolation barrier is a single film layer etch step stopping on selective etch isolation material of the selective etch shallow trench isolation barrier (fig. 14).
- Regarding claim 12, Goh et al. disclose the steps of the intermetal dielectric layer 76 comprises oxide and the single film layer etch step is performed by Ar, CF₄, CHF₃, CO, and/or C₄F₈ (fig. 15, column 5, lines 40-44).
- Regarding claims 14 and 20, AAPA discloses that the selective etch isolation material includes silicon nitride or oxynitride (fig. 1, page 2, lines 6-8).
- Regarding claim 15, AAPA discloses that depositing the selective etch isolation material to fill the shallow trench and removing excess selective etch isolation material by a chemical mechanical polishing (CMP) process (fig. 1, page 2, lines 6-10).
- Regarding claim 16, it would have been well known in the art to pre-cleaning a wafer using high purity, low particle chemicals; heating the wafer and AAPA discloses that exposing the wafer to ultra pure oxygen in a diffusion furnace under carefully controlled condition and forming a silicon dioxide film of uniform thickness of the surface of the wafer (fig. 1, page 2, lines 1-3).

Response to Arguments

Applicant's arguments filed 1/20/05 have been fully considered but they are not persuasive.

The applicant argues that Goh et al. fail to disclose the intermetal dielectric layer and the selective etch material to be in direct contact.

The applicant's argument have been fully considered but they are not persuasive because Goh et al. clearly disclose the step of filing the shallow trench space with material 60 and 56 to form the selective etch shallow trench isolation barrier; and the intermetal dielectric layer is disposed in direct contact with the selective etch isolation material 60 and 56 (fig. 15).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DLN

A handwritten signature in black ink, appearing to read 'Hoai Pham', with a stylized, flowing script.

HOAI PHAM
PRIMARY EXAMINER